ABSTRACT OF THE INVENTION

A low noise multi-loop radio frequency synthesizer is disclosed for the read channel in a hard disk drive, and for RF wireless communications local oscillator applications. The frequency synthesizer receives an input reference signal

5   having a frequency f_R, into a fine tune phase locked loop and into a coarse tune phase locked loop. Driven by the input reference signal, the fine tune PLL outputs a fine tune signal with a frequency $f_R \bullet P$, where P is an integer, while the coarse tune PLL, also driven by the same input reference signal, outputs a coarse tune signal with a frequency $f_R \bullet A$, where A is an integer. A translation

10   phase locked loop has a unity multiplication factor and is driven by the fine tune signal output. The frequency synthesizer finally has a Gilbert cell double balanced mixer coupled between the coarse tune and the translation phase locked loops, wherein the Gilbert cell mixer combines the coarse tune signal and the output signal of the translation phase locked loop and couples the mixed

15   signal into the translation phase locked loop. The translation loop outputs a signal with a frequency which is proportional to the linear sum of the coarse tune signal and the fine tune signal.

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